PATENT SPECIFICATION (11) 1 484 613

1 484 613

(21) Application No. 46577/74 (22) Filed 28 Oct. 1974
(31) Convention Application No. 2 354 100
(32) Filed 29 Oct. 1973 in
(33) Fed. Rep. of Germany (DT)
(44) Complete Specification published 1 Sept. 1977
(51) INT CL² G01N 21/22
(52) Index at acceptance
G1A 247 248 269 357 358 369 400 403 404 406 407 409 40X 447 448 449 457 458 459 469 472 476 478 47X 480 49X 520 52Y 53Y 580 581 589 58Y 590 591 599 59Y 622 761 762

(19)

(54) WINDSCREEN SOILING SENSOR

(71) I, GERHARD KARL, a Citizen of the Federal Republic of Germany, of 4 Uppental, 8701 Frickenhausen, Federal Republic of Germany, do hereby declare

the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a windscreen soiling sensor.

The invention provides a windscreen soiling sensor having a light source which transmits a light onto the windscreen outer surface through a prism and the windscreen, and a light meter which registers the light reflected at the outer surface through the windscreen and a further prism at an angle equal to or greater than the critical angle when the windscreen is clean, and a signal generator responsive to a change in the output of the light meter, characterised in that the light source, the light meter and the prisms are mounted in a common housing the light beam reflected from the outer surface being selected by an optical system and a diaphragm and being focussed onto the light meter, the prisms being fastened by means of transparent adhesive to the windscreen and the adhesive as well as the prisms have the same or substantially the same reference index as the windscreen.

The second prism emerging beam of light can be made up of a plurality of small prisms, so that a generally flat structural shape is achieved.

In order to enlarge the illuminated measuring surface on the windscreen, the light emitted from the light source can furthermore be totally-reflected a number of times in the windscreen. Optical adjustment of the device susbequent to incorporation thereof into a motor vehicle is not necessary, since the paths of the rays from the light source is already fixed in the device itself.

The invention will be described further by way of example with reference to the accompanying drawing in which the single figure is a diagrammatic sectional plan illustrating a preferred embodiment of the device of the invention.

In the drawing, light from a light source 1 is fed through an optical focussing system 8 (for maximum light yield) to a prism 9 and a mirror 10 and is thereby directed as a beam onto soilable surface 2 of transparent windscreen 21. The totally-reflected light emerges, through a prism plate 11, from the windscreen and is focussed by an optical system 12 onto a photometer 7 having a diaphragm or iris 6. The use of prisms 9 and 11 is necessary because the beam of light has to impinge at, an angle equal to or greater than the critical angle onto the surface 2 of the windscreen 21 when it is clean. It is reflected at the same angle α T.

The photometer 7 generates a specific signal in the case of undisturbed total reflection which represents a good zero point value. Upon variation of the intensity of the reflected light, for example through drops 3 of water, or solid particles 4 of dirt, the photometer 7 generates a new signal and forward same to a signal generator (not shown) which is set to operate if the signal from the photometer deviates by a certain amount from the zero point value. If this occurs, a signal is transmitted which switches on any desired device serving for cleaning the windscreen. In this respect it is material that such a measuring of a totally reflected light beam and of its intensity changes takes place completely uninfluenced by daylight fluctuations and moreover requires a very small light source 1.

To avoid refraction and reflection, the prisms and the adhesive or bonding 15 between the parts have the same or a substantially the same refractive index.

To enlarge that part of the surface on the windscreen which is illuminated, the prisms 10 and 11 are spaced apart. Multiple total

reflection can then take place in the windscreen, so that the illuminated measuring surface on the windscreen is enlarged. The probability that a beam totally-reflected a number of times encounters a drop of water or a particle of dirt and is disturbed in its intensity is in this connection considerably increased.

A housing surrounding the necessary electrical and optical parts is thus in natural size comparatively small.

The described windscreen soiling indicator thus comprises only a few, small structural parts which are scarcely susceptible to trouble. The sensor works always exactly and uninfluenced by varying stray light and can along with the use of transparent adhesives with corresponding optical properties very easily also be adhered to windscreens.

WHAT I CLAIM IS:—

1. A windscreen soiling sensor having a light source which transmits light onto the windscreen outer surface through a prism and the windscreen, and a light meter which registers the light reflected at the outer surface through the windscreen and a further prism at an angle equal to or greater than the critical angle when the windscreen is clean, and a signal generator responsive to a change in the output of the light meter, characterised in that the light source, the light meter and the prisms are mounted in a common housing the light beam reflected from the outer surface being selected by an optical system and a diaphragm and being focussed onto the light meter, the prisms being fastened by means of transparent adhesive to the windscreen and the adhesive as well as the prisms have the same or substantially the same refractive index as the windscreen.

2. A windscreen soiling sensor as claimed in Claim 1 or 2 characterised in that the prism for the beam of light leaving the windscreen is made up of a plurality of small prisms.

3. A windscreen soiling sensor substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.

For the Applicants,
BARLOW, GILLETT & PERCIVAL,
Chartered Patent Agents,
94, Market Street, Manchester, 1,
and
20, Tooks Court, Cursitor Street,
London, E.C.4.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1977.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1484613 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*